

REMARKS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and amended as necessary to more clearly and particularly describe the subject matter which applicant regards as the invention.

Attached hereto is a marked-up version to show the changes made to the application by the present amendment.

Claims 23-46 and 48-57 are pending in the application. Claims 23-35, 48-50 and 54-57 have been indicated as being allowed and will not be discussed hereinafter. Claims 36-46 and 51-53 are discussed in detail hereinbelow.

Claim 53 was objected to under 35 USC §112 for defining subject matter that was not sufficiently described in the specification. The specification has been amended to state that the remainder of the pin can be made from a thermoset plastic material at page 9, line 21. Support for this statement can be found in originally filed claim 17, and thus does not constitute new matter. Accordingly, it is submitted that the Examiner's grounds for objection to claim 53 have been removed. Notice to that effect is respectfully requested.

Claims 36-46 and 51-52 have been objected to under 35 USC §112, second paragraph. These claims have been amended as suggested by the Examiner. With regard to the amendments to claims 36-37, the assistance of Examiner Ball has been appreciated.

The present invention provides a method of joining elements with different functions and to different material types. Anchoring elements are pressed into both microscopic pores and into macroscopic cavities. The cavities are formed by the

penetration of plasticized material into the porous material or substrate. Accordingly, there is a cavity formation, and both microscopic penetration of the pores and macroscopic interlocking with the formed cavity.

Claim 37 stands rejected under 35 USC § 102(b) as being anticipated by Anderson. Anderson discloses a two-part, plastic fastener that functions like a rivet. Each of the fastener parts ("sleeve" and "plug") comprises a head portion and a shank portion. The shank portion of the sleeve part has a conical bore sized and shaped to receive the shank portion of the plug part. The sleeve bore is pre-sized to about the same dimensions as the plug shank. The plug shank is initially received in the sleeve bore without force, and then is rotated and thrust against the inner surface of the bore. The thrust serves to push the plug shank to the bottom of the sleeve bore. The rotation creates friction that liquefies or welds the sleeve and plug together. While the sleeve and plug are friction welded together, no macroscopic cavity is formed in Anderson. Rather, it is specifically noted that, with friction welding alone it is not possible to produce a macroscopic anchor connection. Comparing Figs. 1 and 2 of Anderson shows that the plug part has essentially the same form before and after the application of the thrust and rotation.

In Anderson, the shanks of the two fastener parts are matched to each other, except that the diameter of the shank of the plug part is slightly larger than the inner diameter of the bore of the sleeve part. As described in Col. 3, lines 14 to 28 of Anderson, even the undercut of the bore, as shown in Fig. 4, is matched to the plug part.

With reference to claim 37, it is respectfully submitted that Anderson does not show or suggest that "said thermoplastic material at said first anchor point having been responsive to an application of pressure to said head portion and energy to

said anchor point so as to have formed a macroscopic anchor cavity in said part at said closed inner end", as required. As will be appreciated, Anderson does not teach or suggest formation of such a cavity. Moreover, Anderson does not show or suggest that "said thermoplastic material having been plasticized by said application of pressure and energy so as to have flowed into said macroscopic cavity, and thereby to have formed a macroscopic anchor connection to secure said joining element to said part", as required by claim 37. Clearly, Anderson does not teach or suggest flow of material into a cavity to form an anchor point, as required by amended claim 37. Accordingly, for at least the foregoing reasons, it is respectfully submitted that claim 37 is not anticipated by Anderson. Notice to that effect is hereby requested.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge the same to our Deposit Account No. 18-0160, our Order No. FRR-32641.

Respectfully submitted,

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Attachment: Marked-up version of amendment

IN THE SPECIFICATION:

The paragraph beginning on page 9, line 21 been amended as follows:

If the energy to be supplied to the joining pin is supplied in the form of ultrasonic waves, in the manner shown, joining pin 3.1 must be made from a thermoplastic material in the area of its inner end to be positioned, as shown on the closed bore end 41. The remainder of the pin can be made from the same material or a different material, such as a thermoset plastic material.

IN THE CLAIMS:

The claims have been amended as follows:

36. (Twice amended) A combination of a joining element and a part, said part defining a bore, said bore having a closed inner end, an open outer end, and a cylindrical inner surface, said inner surface having a first cylindrical portion adjacent to said closed inner end, and a second cylindrical portion disposed between said first cylindrical portion and said open outer end, said second cylindrical portion having a diameter larger than said first cylindrical portion, and

said joining element comprising a body member disposed in said bore, said body member having a first and second portion, said first body portion having a diameter about equal to said first cylindrical portion, and a second body portion having a diameter about equal to said second cylindrical portion, said first body portion having an end defining a first anchor point and comprising a first thermoplastic material adjacent to said first anchor point, and said second body portion defining a second anchor point adjacent to said first body portion, and comprising a second thermoplastic material adjacent to said second anchor point,

said body member having responded [being responsive] to an application of pressure and of energy so as to have formed [form] respective macroscopic cavities in said part at said first and second anchor points,

said thermoplastic materials at said first and second anchor points having been plasticized [being plasticizable] by said application of energy and pressure so as to have flowed [flow] into said respective macroscopic anchor cavities in said part.

37. (Twice amended) A combination of a joining element and a part, said part defining a bore having a closed inner end and an open outer end, and

said joining element comprising an elongated body member disposed in said bore, said body member having a thermoplastic material at a first anchor point at a tip adjacent to said closed inner end, and

a head portion on said body member, said head portion being disposed at said open outer end,

said thermoplastic material at said first anchor point having been [being] responsive to an application of pressure to said head portion and energy to said anchor point so as to have formed [form] a macroscopic anchor cavity in said part at said closed inner end, and said thermoplastic material having been plasticized [being plasticizable] by said application of pressure and energy so as to have flowed [flow] into said macroscopic cavity, and thereby to have formed [form] a macroscopic anchor connection to secure said joining element to said part.

38. (Twice amended) [A joining element] The combination according to claim 37 wherein said joining element body is formed as an elongated pin and includes a second anchor point of thermoplastic material spaced from said first anchor point.

39. (Amended) [A joining element] The combination according to claim 38 [and including] wherein said joining element includes an internally threaded opening for receiving an attachment.

40. (Amended) [A joining element] The combination according to claim 38 [and consisting] wherein said joining element consists entirely of thermoplastic material.

41. (Twice amended) [A joining element] The combination according to claim 40 wherein said thermoplastic material at said anchoring points is plasticizable at a lower temperature at said anchor points than at other portions of said joining element.

42. (Amended) [A joining element] The combination according to claim 38 [comprising] wherein said joining element comprises thermosetting material and having [portion of] said thermoplastic material at said preselected anchoring points.

43. (Amended) [A joining element] The combination according to claim 38 wherein said thermoplastic material at said anchoring points includes metal particles incorporated in said thermoplastic material.

44. (Twice amended) [A joining element] The combination according to claim 38 wherein said tip of said joining element is shaped with a point.

45. (Twice amended) [A joining element] The combination according to claim 38 wherein said tip of said joining element is flat or concave.

46. (Amended) [A joining element] The combination according to claim 37 wherein said thermoplastic material is selected from the group consisting of

polyamide, polycarbonate, polyester carbonate, acrylonitrile-butadiene-styrene, styrene-acrylonitrile, polymethylmethacrylate, polyvinyl chloride, polyethylene, polypropylene and polystyrene.

51. (Amended) A joining element according to claim 50 and including an internally threaded opening in said body for receiving a fitting [an attachment].

52. (Amended) A joining element according to claim 49 wherein said thermoplastic material at said anchoring points is plasticizable at a lower temperature at said anchoring point [points] than at other portions of said joining element.